Figure 1, HCV J4L6 genome wild-type cDNA sequence, reference accession number
AF054247,

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Figure 2, codon optimised HCV Core polynucleotide

ATGAGCACCAACCCCAAGCCCCAGCGCAAGACCAAGCGGAACACCAACCGGAGACCCCAGGA

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CCCGGCTGGGCGTGCGCGCCACCCGCAAGACCAGCGAGCGCTCCCAGCCAAGAGGCAGACGC

CAGCCGATCCCGAAGGCCCGCCGCCCTGAGGGCCGGGCTTGGGCCCAGCCAGGCTACCCCTG

GCCCCTGTATGGCAACGAGGGCCTGGGATGGGCTGGGTGGCTCCTCAGCCCCCGGGGGTCTA

GGCCCAGTTGGGGACCGACCGACCCCCGCAGGCGCAGCCGCAACCTGGGAAAGGTGATCGAC

ACGCTCACCTGCGGCTTCGCCGACTTGATGGGATACATCCCTCTGGTGGGGGCCCCTCTGGG

CGGAGCCGCGCGCGCCCTGGCTCACGGGGTCCGGGTGCTCGAGGACGGGGTGAACTACGCCA

CCGGGAACCTGCCCGGCTGCAGCTTCTCCATCTTCCTGCTGGCGCTGCTGAGCTGCCTCACC

ATCCCCGCTAGCGCATGA

Figure 3, Codon optimised HCV NS3 polynucleotide

ATGGCCCCCATCACCGCCTACAGCCAGCAGACCCGGGGACTGCTCGGCTGCATCATCACCTC

TCTGACAGGCCGGGATAAGAACCAGGTGGAGGGCGAGGTGCAGGTCGTCTCGACCGCTACCC

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TGTACCGCCTGGGCGCGGTGCAGAACGAAGTCACCTTGACCCACCCCATCACCAAGTACATC

ATGGCGTGCATGTCCGCTGACCTGGAGGTGGTCACCTGA

Figure 4, codon optimised HCV NS4B polynucleotide

ATGTTTTGGGCCAAGCATATGTGGAACTTCATCAGCGGCATCCAGTACCTCGCCGGGCTGAG

CACCCTCCCGGGCAACCCCGCGATCGCAAGCCTGATGGCGTTCACAGCGAGCATCACCTCCC

CCCTGACTACCCAGAACACACTGCTGTTCAACATCCTGGGGGGCTGGGTCGCCGCTCAGCTG

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CGAGGACTGCTCCACCCCTTGCTGA

Figure 5, codon optimised HCV NS5B polynucleotide

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TCATGTACGCCCCTACCCTGTGGGCTCGCATGATCCTGATGACCCACTTCTTCAGTATCCTC
CTCGCTCAGGAGCAGCTGGAGAAGGCGCTCGACTGCCAGATCTACGGCGCCTGCTATAGTAT
CGAGCCTCTCGACCTGCCCCAGATCATCGAGAGACTGCATGGGCTCAGCGCCTTCTCCCTCC
ATAGTTACTCTCCTGGAGAAATTAACCGGGTGGCGAGCTGTCTGCGGAAGCTCGGCGTCCCC
CCTCTGCGCGTTTGGCGGCATCGCGCCAGGAGTGTGAGGGCCAAGCTGCTGAGCCAGGGCGG
AAGGGCCGCCACCTGCGGCCGGTATCTCTTCAACTGGGCCGTGCGCACCAAGCTCAAGCTCA
CCCCCATCCCTGCCGCCAGTCAGCTGGATCTCAGTGGGTGGTTCGTGGCCGGCTATTCTGGC
GGCGACATCTACCACTCCCTCAGCAGGGCGCGCCCCCGCTGGTTCCCCCTGTGCCTGCTGCT
CCTGAGCGTCGGAGTCGGCATCTACCTGCTGCCCAACCGCTGA
```

Figure 6,   *Translation of HCV J4L6 genome (wild-type sequence)*

```
   1 MSTNPKPQRK TKRNTNRRPQ DVKFPGGGQI VGGVYLLPRR GPRLGVRATR KASERSQPRG
  61 RRQPIPKARR PEGRAWAQPG YPWPLYGNEG LGWAGWLLSP RGSRPSWGPT DPRRRSRNLG
 121 KVIDTLTCGF ADLMGYIPLV GAPLGGAARA LAHGVRVLED GVNYATGNLP GCSFSIFLLA
 181 LLSCLTIPAS AYEVRNVSGI YHVTNDCSNS SIVYEAADVI MHTPGCVPCV QEGNSSRCWV
 241 ALTPTLAARN ASVPTTTIRR HVDLLVGTAA FCSAMYVGDL CGSIFLVSQL FTFSPRRHET
 301 VQDCNCSIYP GHVSGHRMAW DMMMNWSPTT ALVVSQLLRI PQAVVDMVAG AHWGVLAGLA
 361 YYSMVGNWAK VLIVALLFAG VDGETHTTGR VAGHTTSGFT SLFSSGASQK IQLVNTNGSW
 421 HINRTALNCN DSLQTGFFAA LFYAHKFNSS GCPERMASCR PIDWFAQGWG PITYTKPNSS
 481 DQRPYCWHYA PRPCGVVPAS QVCGPVYCFT PSPVVVGTTD RSGVPTYSWG ENETDVMLLN
 541 NTRPPQGNWF GCTWMNSTGF TKTCGGPPCN IGGVGNRTLI CPTDCFRKHP EATYTKCGSG
 601 PWLTPRCLVD YPYRLWHYPC TLNFSIFKVR MYVGGVEHRL NAACNWTRGE RCNLEDRDRS
 661 ELSPLLLSTT EWQILPCAFT TLPALSTGLI HLHQNIVDVQ YLYGVGSAFV SFAIKWEYIL
 721 LLFLLLADAR VCACLWMMLL IAQAEAALEN LVVLNAASVA GAHGILSFLV FFCAAWYIKG
 781 RLAPGAAYAF YGVWPLLLLL LALPPRAYAL DREMAASCGG AVLVGLVFLT LSPYYKVFLT
 841 RLIWWLQYFI TRAEAHMQVW VPPLNVRGGR DAIILLTCAV HPELIFDITK LLLAILGPLM
 901 VLQAGITRVP YFVRAQGLIR ACMLVRKVAG GHYVQMVFMK LGALTGTYVY NHLTPLRDWA
 961 HAGLRDLAVA VEPVVFSAME TKVITWGADT AACGDIILGL PVSARRGKEI FLGPADSLEG
1021 QGWRLLAPIT AYSQQTRGVL GCIITSLTGR DKNQVEGEVQ VVSTATQSFL ATCINGVCWT
1081 VYHGAGSKTL AGPKGPITQM YTNVDLDLVG WQAPPGARSM TPCSCGSSDL YLVTRHADVI
1141 PVRRRGDSRG SLLSPRPVSY LKGSSGGPLL CPSGHVVGVF RAAVCTRGVA KAVDFIPVES
1201 METTMRSPVF TDNSTPPAVP QTFQVAHLHA PTGSGKSTKV PAAYAAQGYK VLVLNPSVAA
1261 TLGFGAYMSK AHGIDPNIRT GVRTITTGGS ITYSTYGKFL ADGGCSGGAY DIIICDECHS
1321 TDSTTILGIG TVLDQAETAG ARLVVLATAT PPGSVTVPHP NIEEIGLSNN GEIPFYGKAI
1381 PIEAIKGGRH LIFCHSKKKC DELAAKLTGL GLNAVAYYRG LDVSVIPPIG DVVVVATDAL
1441 MTGFTGDFDS VIDCNTCVTQ TVDFSLDPTF TIETTTVPQD AVSRSQRRGR TGRGRSGIYR
1501 FVTPGERPSG MFDSSVLCEC YDAGCAWYEL TPAETSVRLR AYLNTPGLPV CQDHLEFWES
1561 VFTGLTHIDA HFLSQTKQAG DNFPYLVAYQ ATVCARAQAP PPSWDQMWKC LIRLKPTLHG
1621 PTPLLYRLGA VQNEVILTHP ITKYIMACMS ADLEVVTSTW VLVGGVLAAL AAYCLTTGSV
1681 VIVGRIILSG KPAVVPDREV LYQEFDEMEE CASQLPYIEQ GMQLAEQFKQ KALGLLQTAT
1741 KQAEAAAPVV ESKWRALETF WAKHMWNFIS GIQYLAGLST LPGNPAIASL MAFTASITSP
1801 LTTQNTLLFN ILGGWVAAQL APPSAASAFV GAGIAGAAVG SIGLGKVLVD ILAGYGAGVA
1861 GALVAFKVMS GEVPSTEDLV NLLPAILSPG ALVVGVVCAA ILRRHVGPGE GAVQWMNRLI
1921 AFASRGNHVS PTHYVPESDA AARVTQILSS LTITQLLKRL HQWINEDCST PCSGSWLRDV
1981 WDWICTVLTD FKTWLQSKLL PRLPGVPFLS CQRGYKGVWR GDGIMQTTCP CGAQIAGHVK
2041 NGSMRIVGPR TCSNTWHGTF PINAYTTGPC TPSPAPNYSR ALWRVAAEEY VEVTRVGDFH
2101 YVTGMTTDNV KCPCQVPAPE FFTEVDGVRL HRYAPACKPL LREDVTFQVG LNQYLVGSQL
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2161 PCEPEPDVTV LTSMLTDPSH ITAETAKRRL ARGSPPSLAS SSASQLSAPS LKATCTTHHD
2221 SPDADLIEAN LLWRQEMGGN ITRVESENKV VILDSFEPLH AEGDEREISV AAEILRKSRK
2281 FPSALPIWAR PDYNPPLLES WKDPDYVPPV VHGCPLPPTK APPIPPPRRK RTVVLTESNV
2341 SSALAELATK TFGSSGSSAV DSGTATALPD LASDDGDKGS DVESYSSMPP LEGEPGDPDL
2401 SDGSWSTVSE EASEDVVCCS MSYTWTGALI TPCAAEESKL PINPLSNSLL RHHNMVYATT
2461 SRSASLRQKK VTFDRLQVLD DHYRDVLKEM KAKASTVKAK LLSIEEACKL TPPHSAKSKF
2521 GYGAKDVRNL SSRAVNHIRS VWEDLLEDTE TPIDTTIMAK SEVFCVQPEK GGRKPARLIV
2581 FPDLGVRVCE KMALYDVVST LPQAVMGSSY GFQYSPKQRV EFLVNTWKSK KCPMGFSYDT
2641 RCFDSTVTES DIRVEESIYQ CCDLAPEARQ AIRSLTERLY IGGPLTNSKG QNCGYRRCRA
2701 SGVLTTSCGN TLTCYLKATA ACRAAKLQDC TMLVNGDDLV VICESAGTQE DAAALRAFTE
2761 AMTRYSAPPG DPPQPEYDLE LITSCSSNVS VAHDASGKRV YYLTRDPTTP LARAAWETAR
2821 HTPINSWLGN IIMYAPTLWA RMILMTHFFS ILLAQEQLEK ALDCQIYGAC YSIEPLDLPQ
2881 IIERLHGLSA FTLHSYSPGE INRVASCLRK LGVPPLRTWR HRARSVRAKL LSQGGRAATC
2941 GRYLFNWAVR TKLKLTPIPA ASQLDLSGWF VAGYSGGDIY HSLSRARPRW FPLCLLLLSV
3001 GVGIYLLPNR
```

Figure 7, p7313-ie
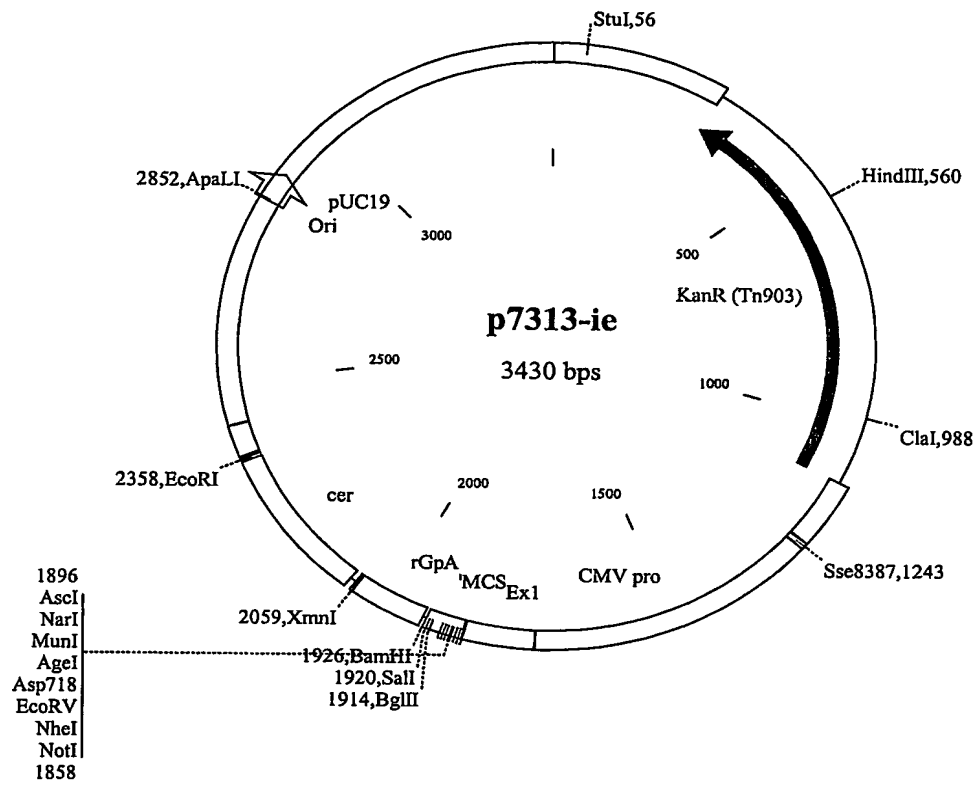
Figure 8, Immune responses to Core
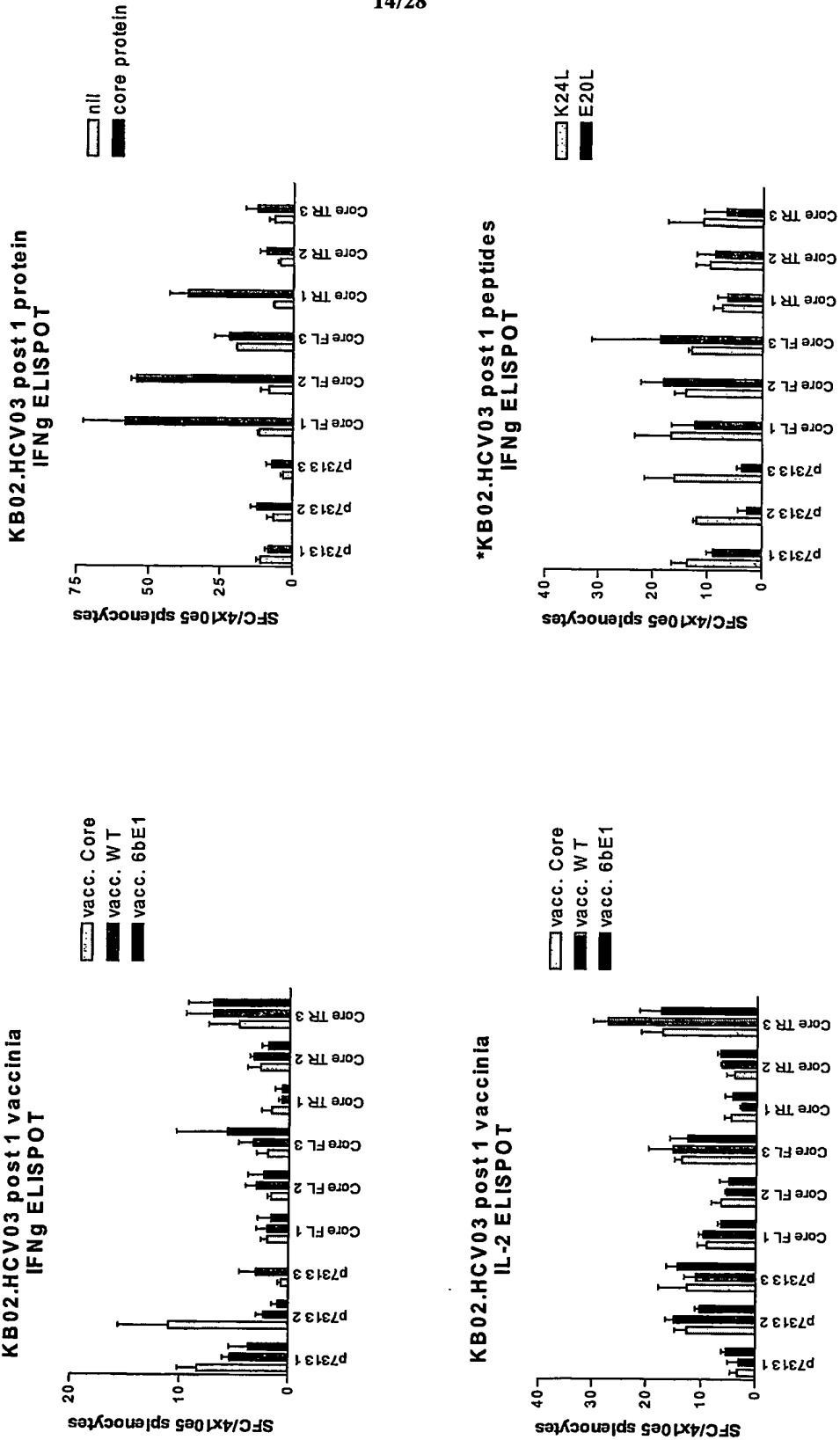
Figure 9, NS3 immunogenicity

WO 2004/046176   PCT/EP2003/012830

16/28
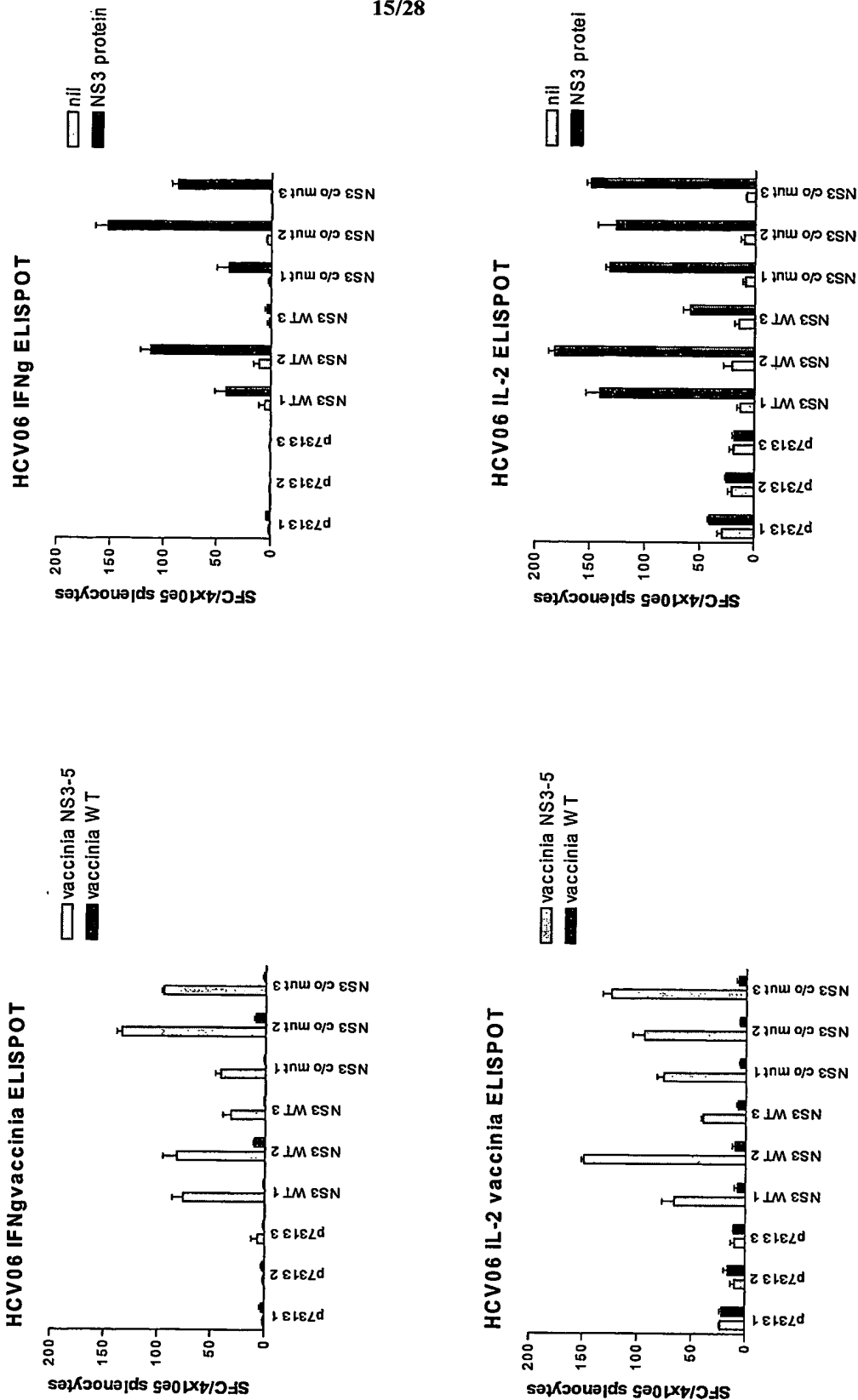
Figure 10, Immune responses to NS4B
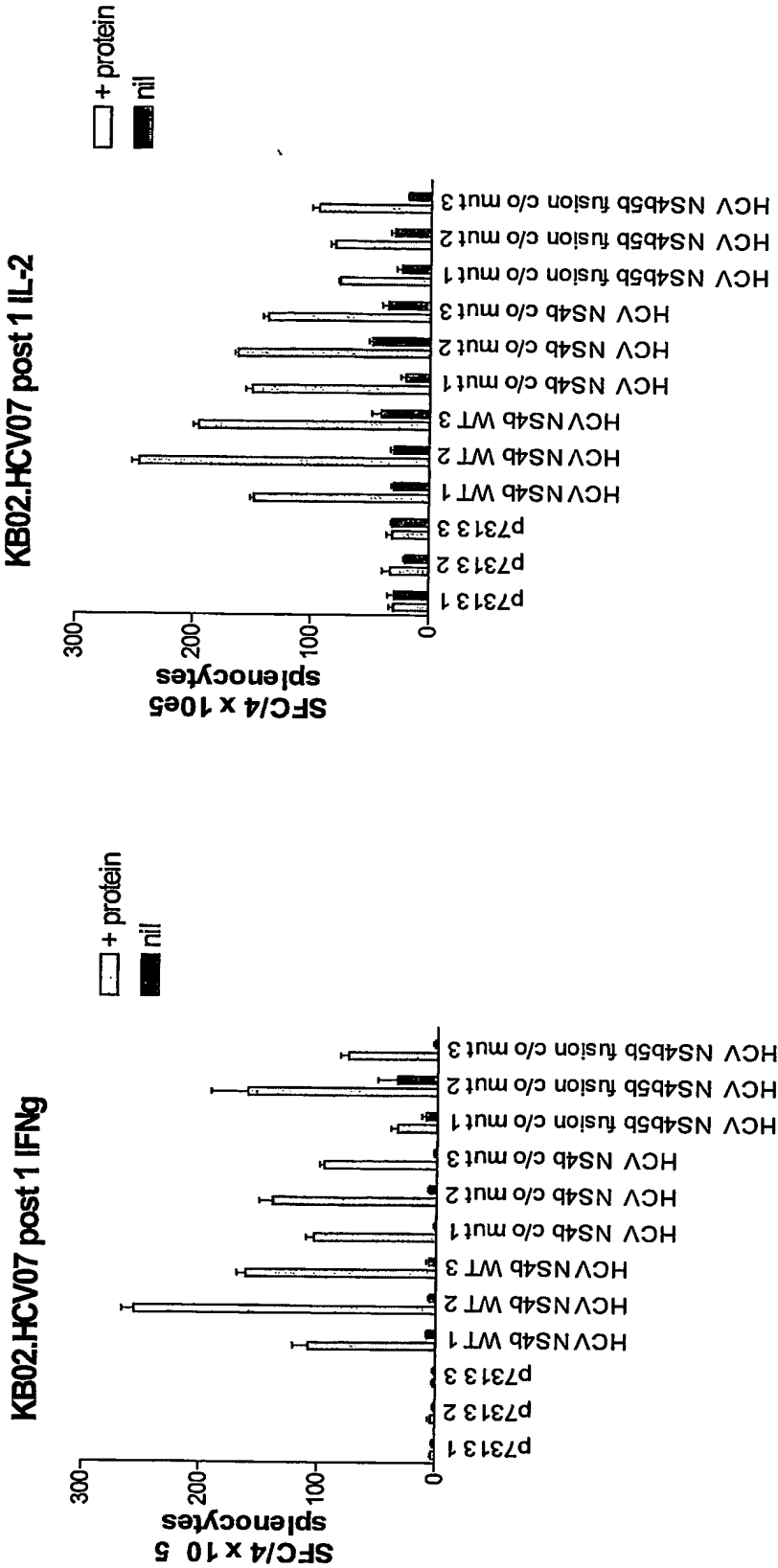
Figure 11, NS5B immune responses
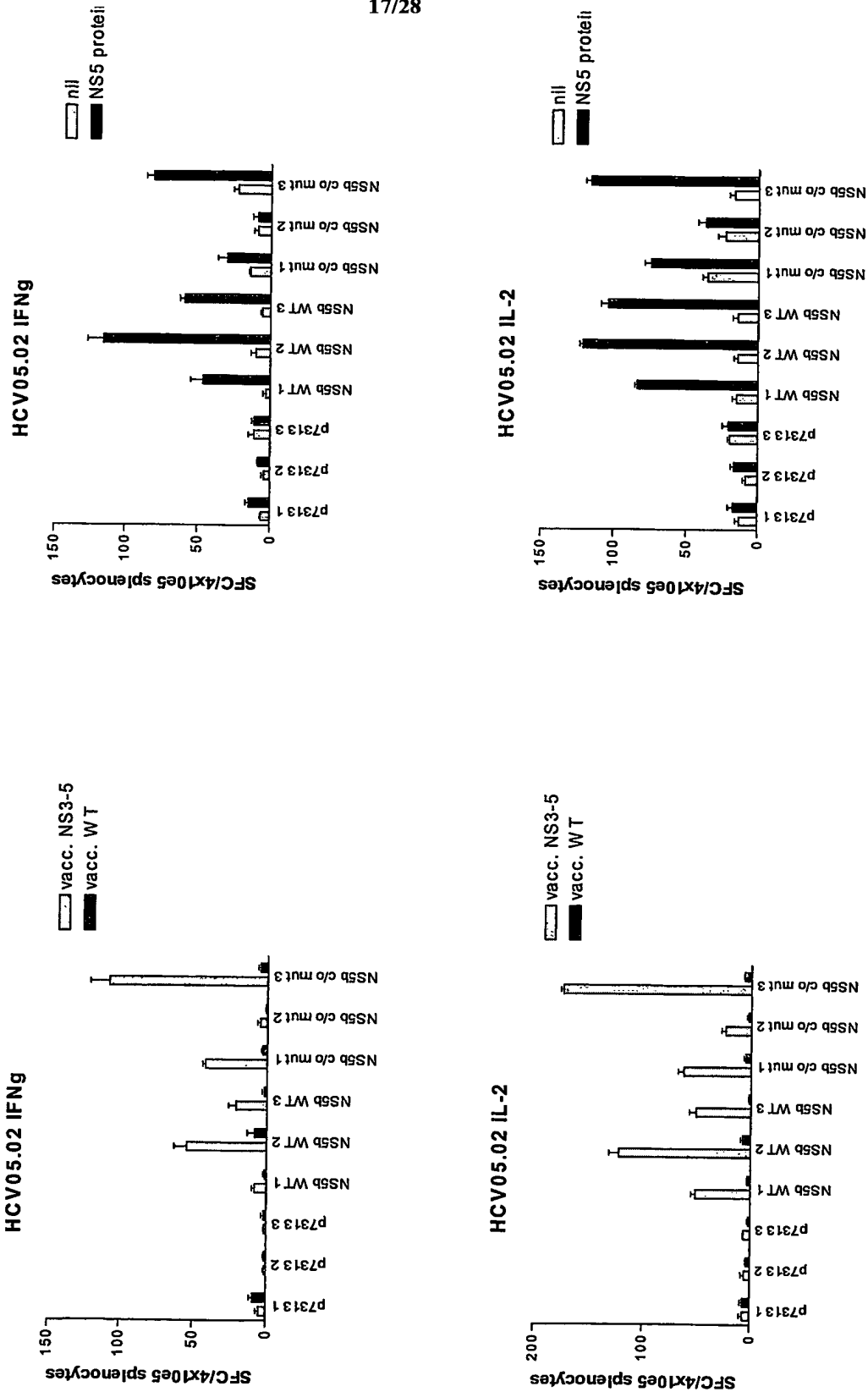
FIG. 12

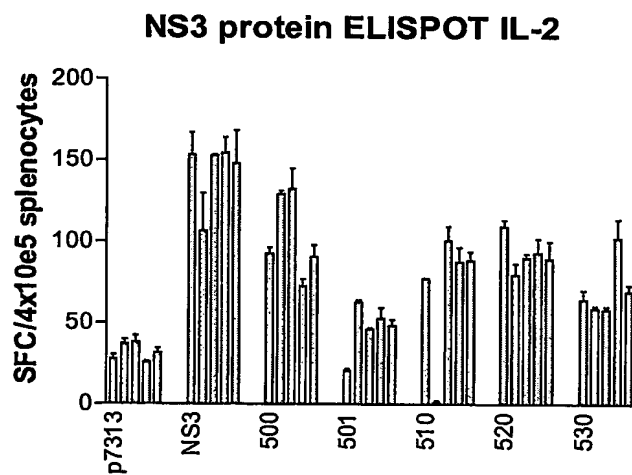## Anti-HCV NS5B

FIG. 13, A

NS3 protein ELISPOT IL-2

B.

NS3 protein ELISPOT (IFNg)

FIG 14.

Vaccinia ELISPOT IFNg

Vaccinia ELISPOT IL-2

FIG. 15,

0.01 ug coding DNA
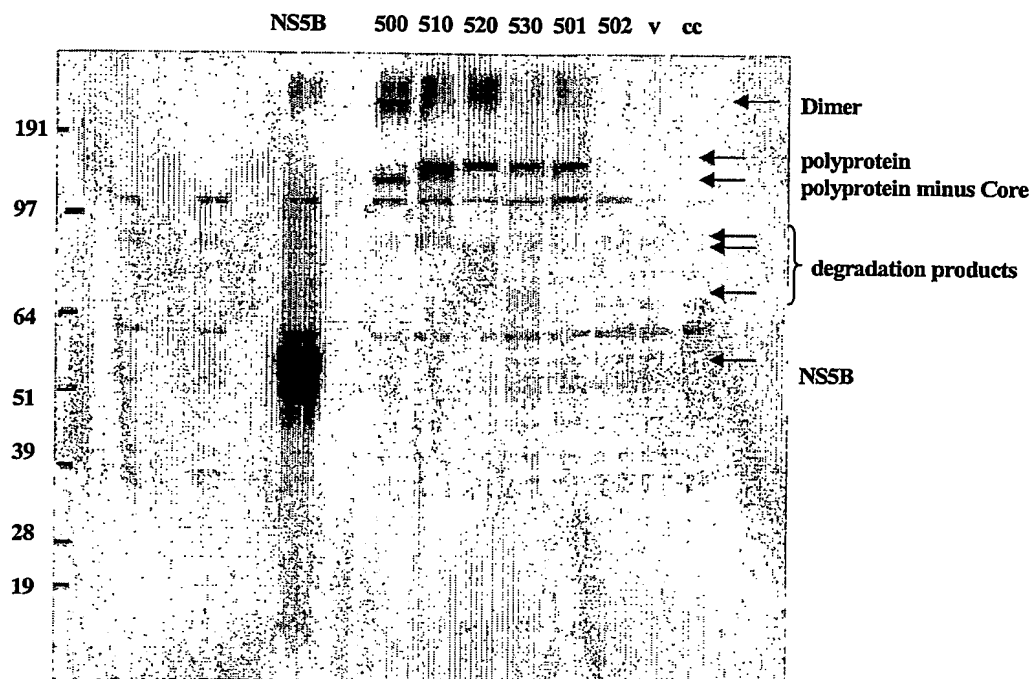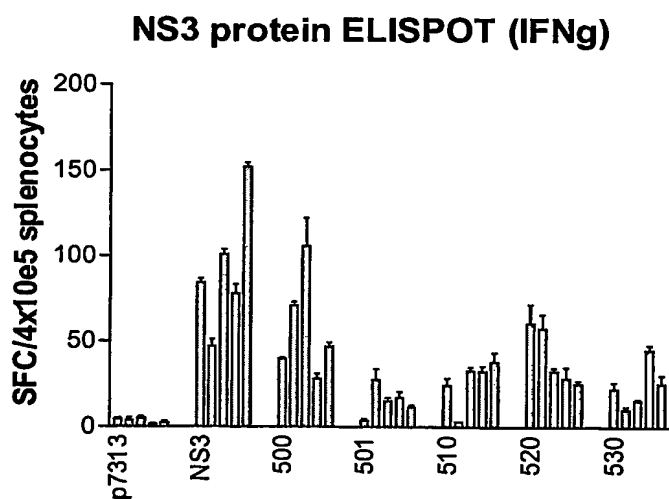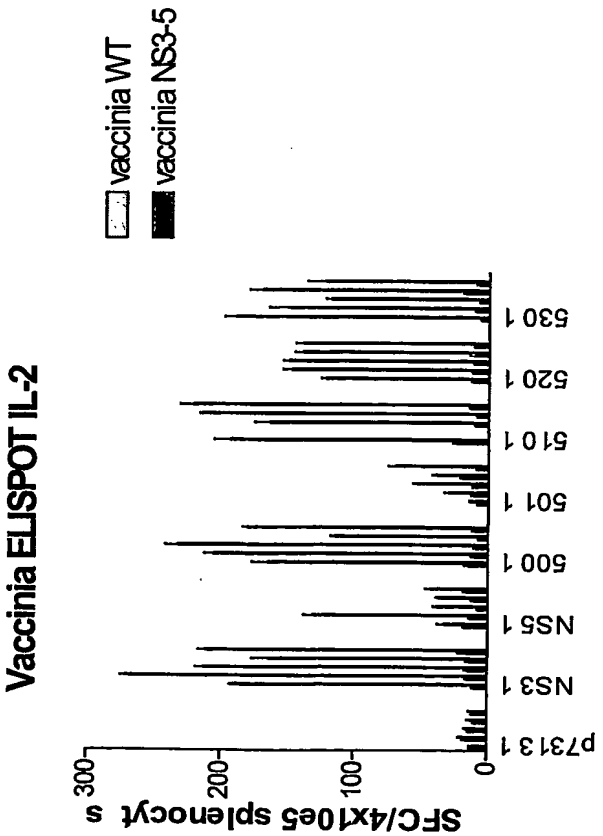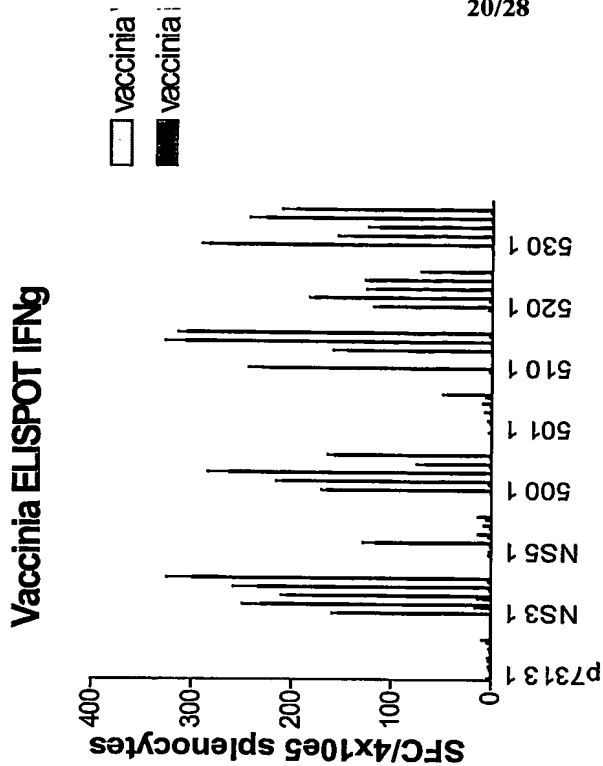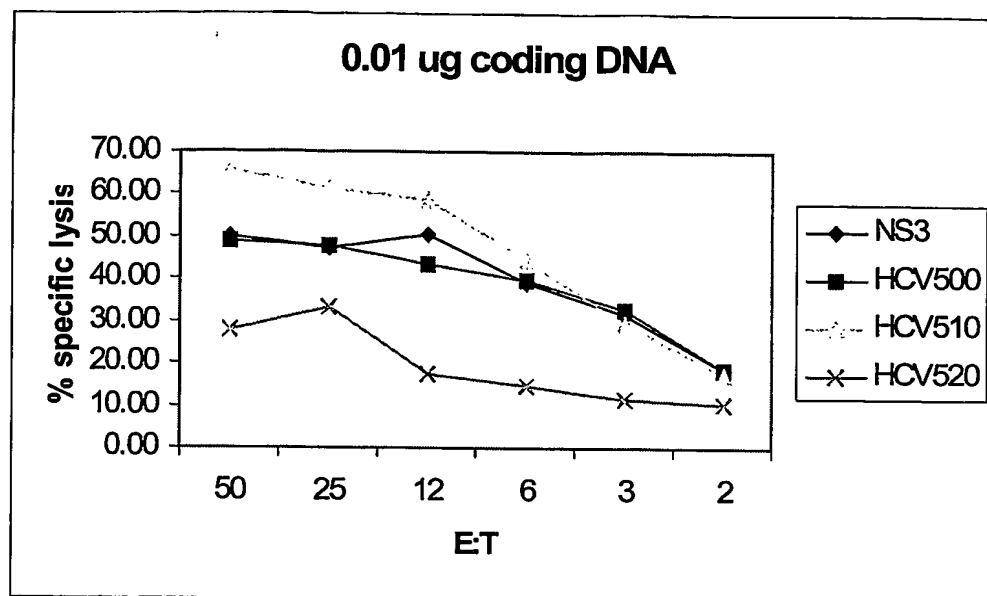
FIG. 16,

FIG. 17,C mparison of NS3 T cell response induced by dual promoter constructs.
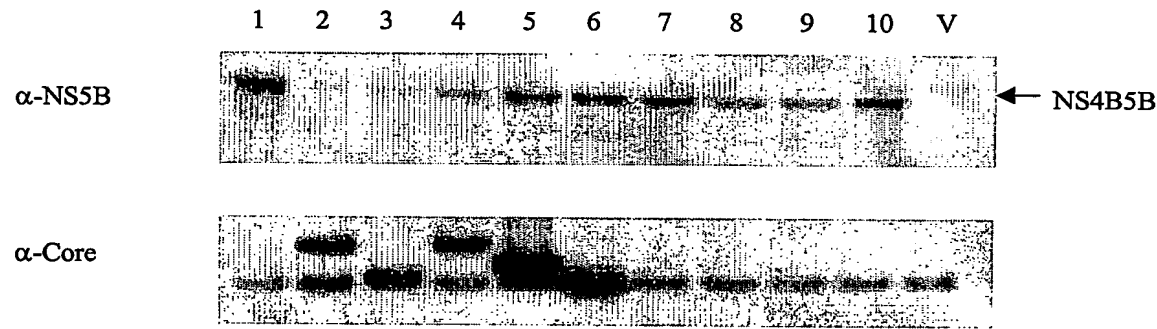

KB03.HCV07 post primary IL-2 ELISpot
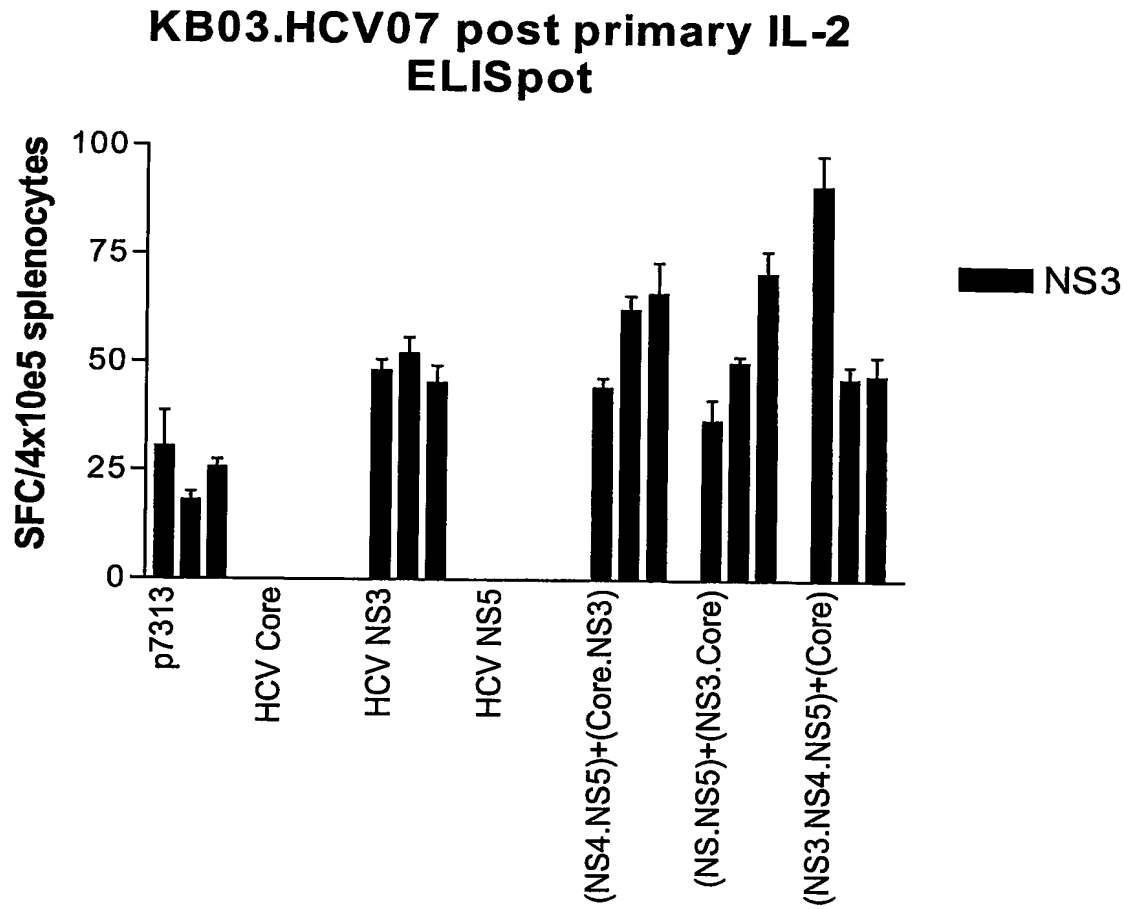
FIG. 18,
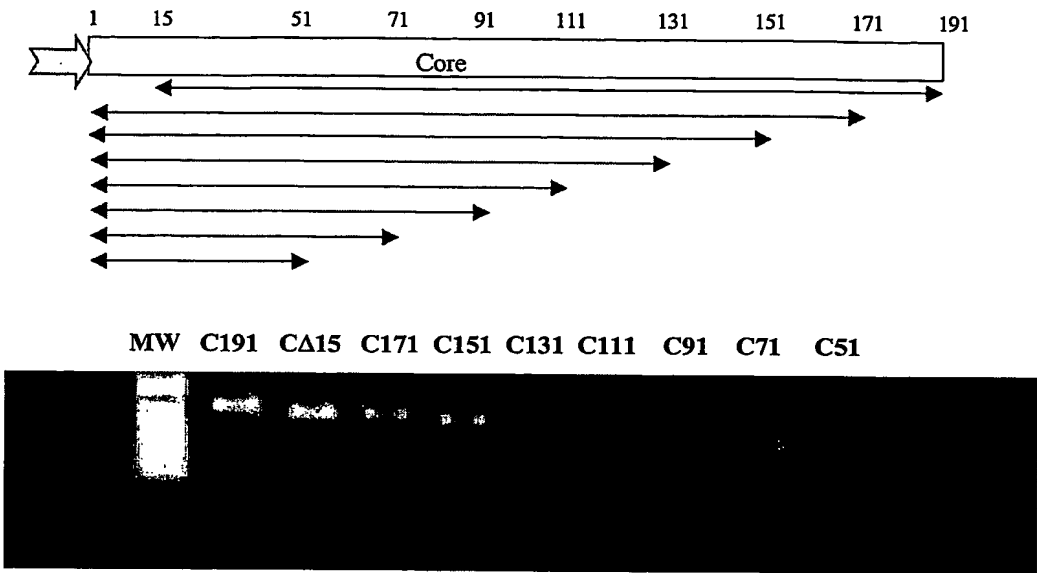
FIG. 19.

FIG. 20,

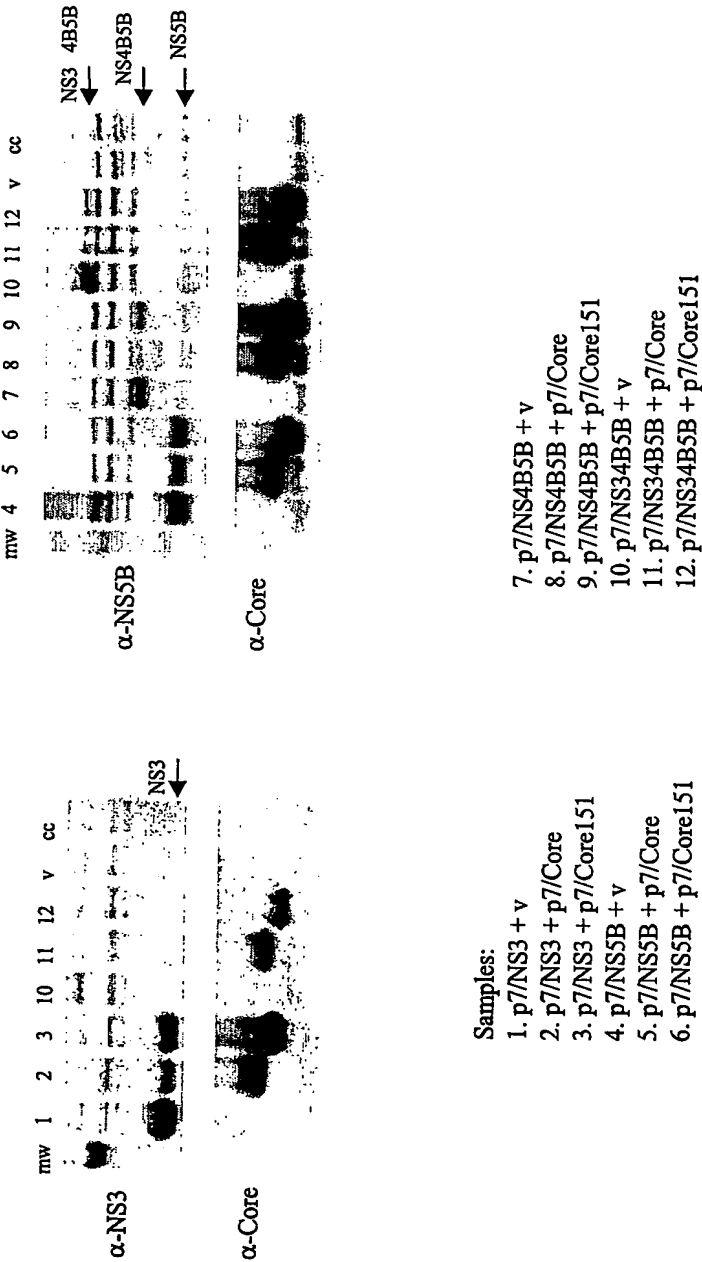Effect of Core and Core$_{51}$ upon expression of NS3, NS5B, NS4B5B, and NS34B5B after co-transfection in 293T cells

Samples:
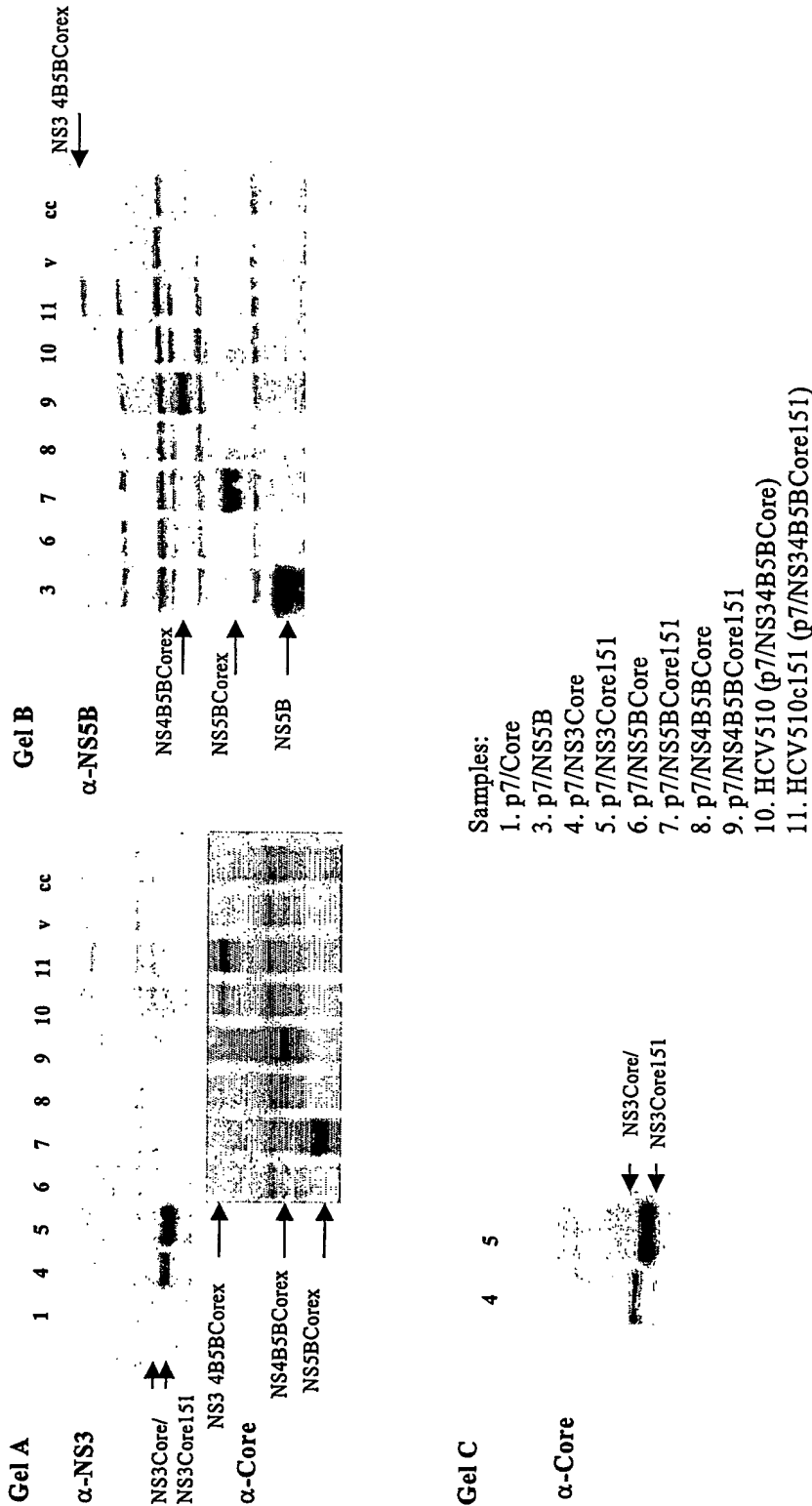1. p7/NS3 + v
2. p7/NS3 + p7/Core
3. p7/NS3 + p7/Core151
4. p7/NS5B + v
5. p7/NS5B + p7/Core
6. p7/NS5B + p7/Core151

7. p7/NS4B5B + v
8. p7/NS4B5B + p7/Core
9. p7/NS4B5B + p7/Core151
10. p7/NS34B5B + v
11. p7/NS34B5B + p7/Core
12. p7/NS34B5B + p7/Core151

FIG. 21,

Effect on expression of fusion proteins, after substitution of Core$_{191}$ for Core$_{191}$, in transient transfection in 293T cells
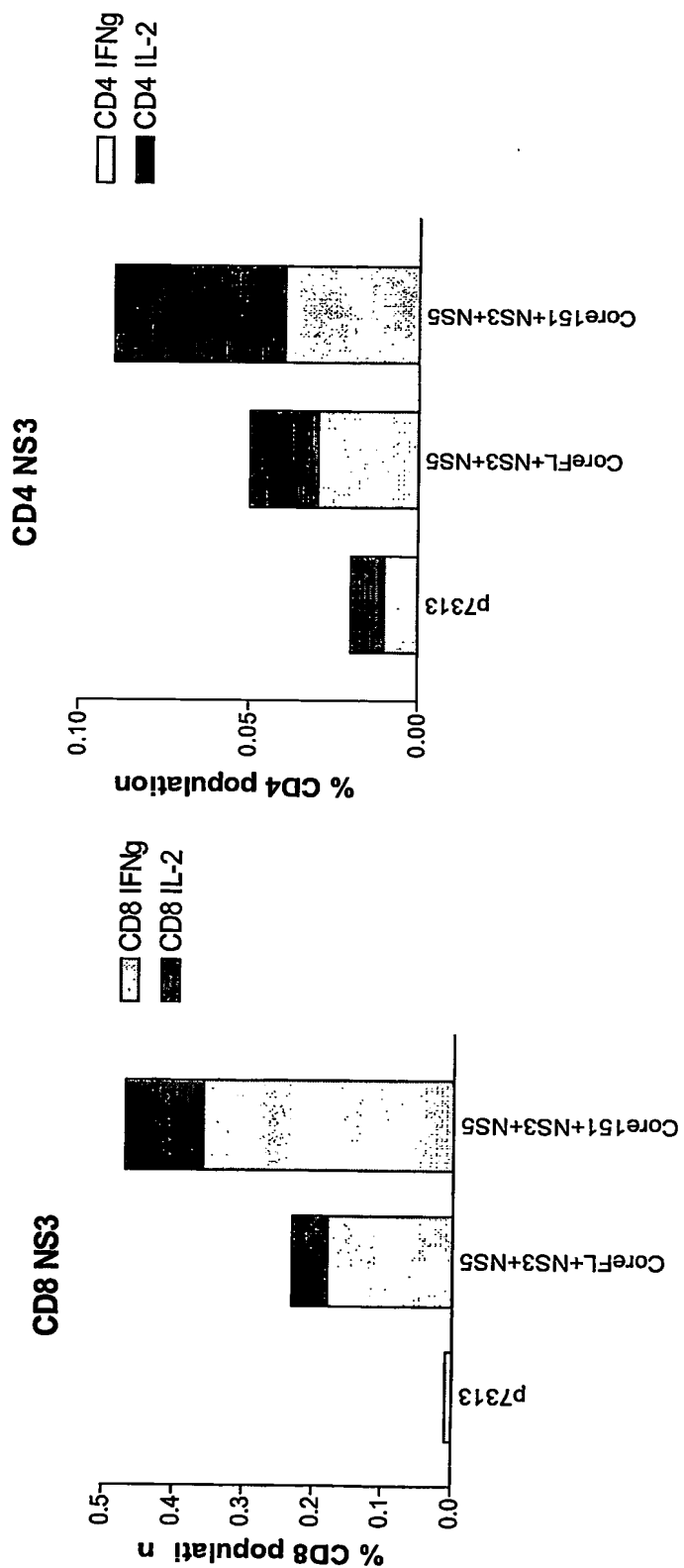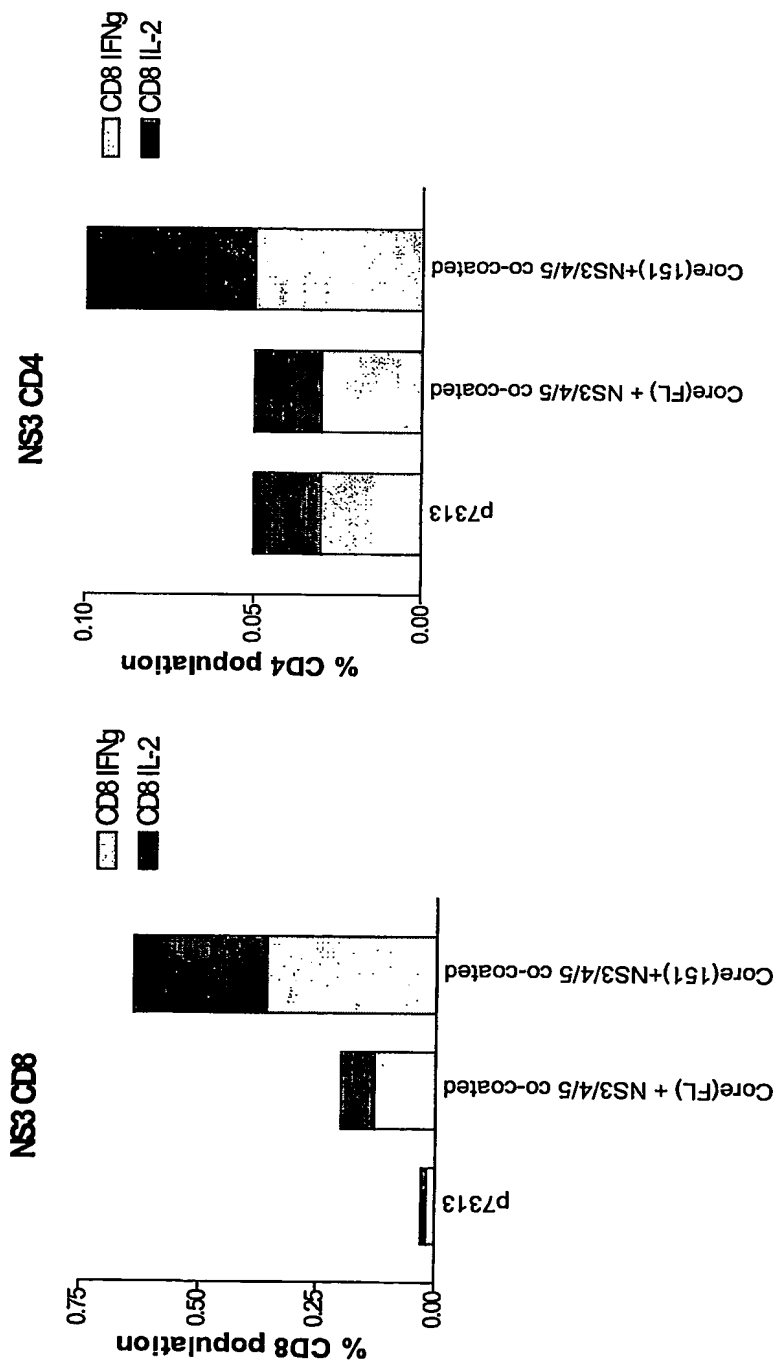

Samples:
1. p7/Core
3. p7/NS5B
4. p7/NS3Core
5. p7/NS3Core151
6. p7/NS5BCore
7. p7/NS5BCore151
8. p7/NS4B5BCore
9. p7/NS4B5BCore151
10. HCV510 (p7/NS34B5BCore)
11. HCV510c151 (p7/NS34B5BCore151)

FIG. 22,

FIG. 23,

NS3 CD4

NS3 CD8